

CLAIMS

We claim:

1. A method of performing network packet filtering, said method comprising:
preprocessing a set of rules to generate a set of rule ranges along N dimensions;
searching said rule ranges along said N dimensions in parallel to generate N sets of possible rules along said N dimensions;
logically combining said N sets of possible rules to generate a final set of possible rules; and
applying said final set of possible rules.

2. The method as claimed in claim 1 further comprising:
generating a rule bit vector for each rule range along each of said N dimensions;

3. The method as claimed in claim 1 further comprising:
generating a search structure for each set of rule ranges along each of said N dimensions;

4. The method as claimed in claim 3 wherein one of said search structures comprises a look-up table.

1 5. The method as claimed in claim 3 wherein one of said search
2 structures comprises a tree search structure.

1 6. The method as claimed in claim 1 wherein applying said final set
2 of possible rules comprises selecting a highest priority rule in said final set of possible
3 rules.

1 7. The method as claimed in claim 1 wherein applying said final set
2 of possible rules comprises applying all rules in said final set of possible rules.

1 8. The method as claimed in claim 1 wherein each of said N sets of
2 possible rules comprise a rule bit vector that specifies a set of rules that may apply.

1 9. The method as claimed in claim 8 wherein said rule bit vectors are
2 logically ANDed together to produce a final bit vector of rules that apply.

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10. The method as claimed in claim 9 wherein applying said final set of possible rules comprises selecting a highest priority rule in said final set of possible rules.

1 11. A method of pre-processing a set of rules for processing incoming
2 data units, said incoming data units having a set of N dimensions to examine, said method
3 comprising:
4 dividing each of said N dimensions into a contiguous set of rule ranges;
5 assigning each of said rule ranges a range identifier; and
6 creating a search structure for each of said N dimensions that organizes said rule
7 ranges along each dimension such that an incoming data unit may be quickly
8 classified into one of said rule ranges.



1 12. The method as claimed in claim 11 wherein said range identifier
2 comprises a rule bit vector that specifies a set of rules that may apply to incoming data
3 units that fall within the associated rule range.

1 13. The method as claimed in claim 12 wherein said rule bit vectors
2 are logically ANDed together by a rule processor to produce a final bit vector of rules that
3 apply.

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1 14. The method as claimed in claim 13 wherein said rule processor
2 selects a highest priority rule in said final set of possible rules.

1 15. The method as claimed in claim 11 wherein said range identifier
2 comprises an index value.

1 16. The method as claimed in claim 15 wherein said index values are
2 used by a rule processor to index into a N dimensional look-up table for a final rule.



1 17. The method as claimed in claim 11 wherein one of said search
2 structures comprises a look-up table.

1 18. The method as claimed in claim 11 wherein one of said search
2 structures comprises a tree search structure.

1 19. A method of processing incoming data units, said incoming data
 2 units having a set of N dimensions to examine, said method comprising:
 3 searching N search structures for said N dimensions in parallel to classify
 4 incoming data units into a matching rule range along each of said N
 5 dimensions;
 6 logically combining said N matching rule ranges to generate a final set of possible
 7 rules; and
 8 applying said final set of possible rules.

1 20. The method as claimed in claim 19 wherein each rule range
 2 comprises a range identifier.



1 21. The method as claimed in claim 20 wherein said range identifier
 2 comprises a rule bit vector that specifies a set of rules that may apply to incoming data
 3 units that fall within the associated rule range.

1 22. The method as claimed in claim 21 wherein said step of logically
 2 combining said N matching rule ranges comprises logically ANDing together said rule bit
 3 vectors to produce a final set of possible rules.

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1 23. The method as claimed in claim 22 wherein said applying said
2 final set of possible rules comprises selecting a highest priority rule in said final set of
3 possible rules.

1 24. The method as claimed in claim 20 wherein said range identifier
2 comprises an index value.

1 25. The method as claimed in claim 20 wherein said index values are
2 used to index into a N dimensional look-up table for a final rule.

1 26. The method as claimed in claim 19 wherein one of said N search
2 structures comprises a look-up table.

1 27. The method as claimed in claim 19 wherein one of said search
2 structures comprises a tree search structure.

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